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# The Impact of Added Load on Measures of Power and Agility in a Tactical Population: A Critical Review

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## INTRODUCTION

Tactical populations, by nature of their occupations, are often required to perform tasks that require reacting and moving very quickly. These populations are also required to carry additional loads on a daily basis, such as stab-resistant body armour [1]. It has been established that load carriage impacts mobility [2], and that survival in the field may rely on the mobility of the tactical personnel. The ability for humans to generate power and agility is critical for performance of the high-intensity movements required when performing duty tasks. Considering this, how load carriage impacts on the power and agility of the tactical personnel is of importance.

## PURPOSE

The purpose of this review was to critically examine the current literature investigating the impacts of load carriage on measures of power and agility and to synthesise the findings.



## KEY REFERENCES

- [1]. Dempsey, P.C., P.J. Handcock, and N.J. Rehrer, Body armour: the effect of load, exercise and distraction on landing forces. *J Sports Sci*, 2014. 32(4): p. 301-6. [2]. Dempsey, P.C., Handcock, P.J., Rehrer, N.J. Impact of police body armour and equipment on mobility. *Applied Ergonomics*, 2013. 44(6): p. 957-961. [3]. Downs, S.H. and Black, N. The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology and Community Health*, 1998. 52(6): p. 377. [4]. Kennelly, J. *Reducing Racial/Ethnic Disparities in Reproductive and Perinatal Outcomes*, 1st ed; Springer: New York, NY, USA, 2011. [5] Lewinski, W.J., et al., The influence of officer equipment and protection on short sprinting performance. *Applied Ergonomics*, 2015. 47: p. 65-71

## METHODS

- Reviewers (AJ, AW) completed a search of the literature using key search terms in the following databases: PUBMED, EMBASE, CINAHL, SPORTDiscus
- After identifying relevant studies (process detailed in Figure 1), reviewers appraised each study using a modified Downs and Black checklist [3]. The Critical Appraisal Score (CAS) of each article, represented in a percentage, was determined by a third author (RO) by settling any discrepancies between the raters.
- The level of interrater agreement was determined using a Cohen's kappa coefficient. Scores were then subjected to Kennelly's rating system [4], and given a grade of 'good' (>61%), 'fair' (45-61%), or 'poor' (<45%).
- Once appraisal was completed, pertinent data were extracted.

Figure 1. PRISMA diagram detailing screening process

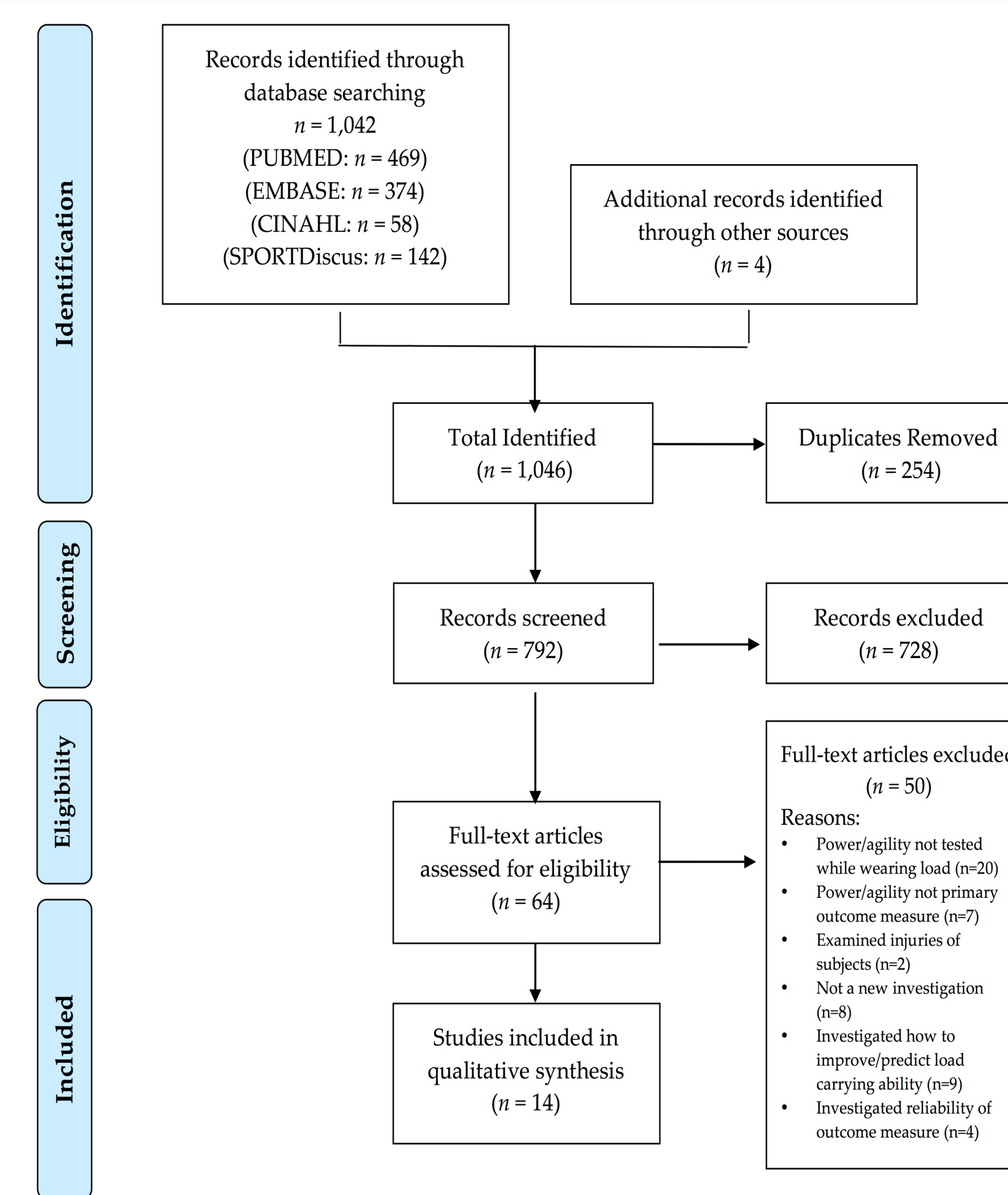
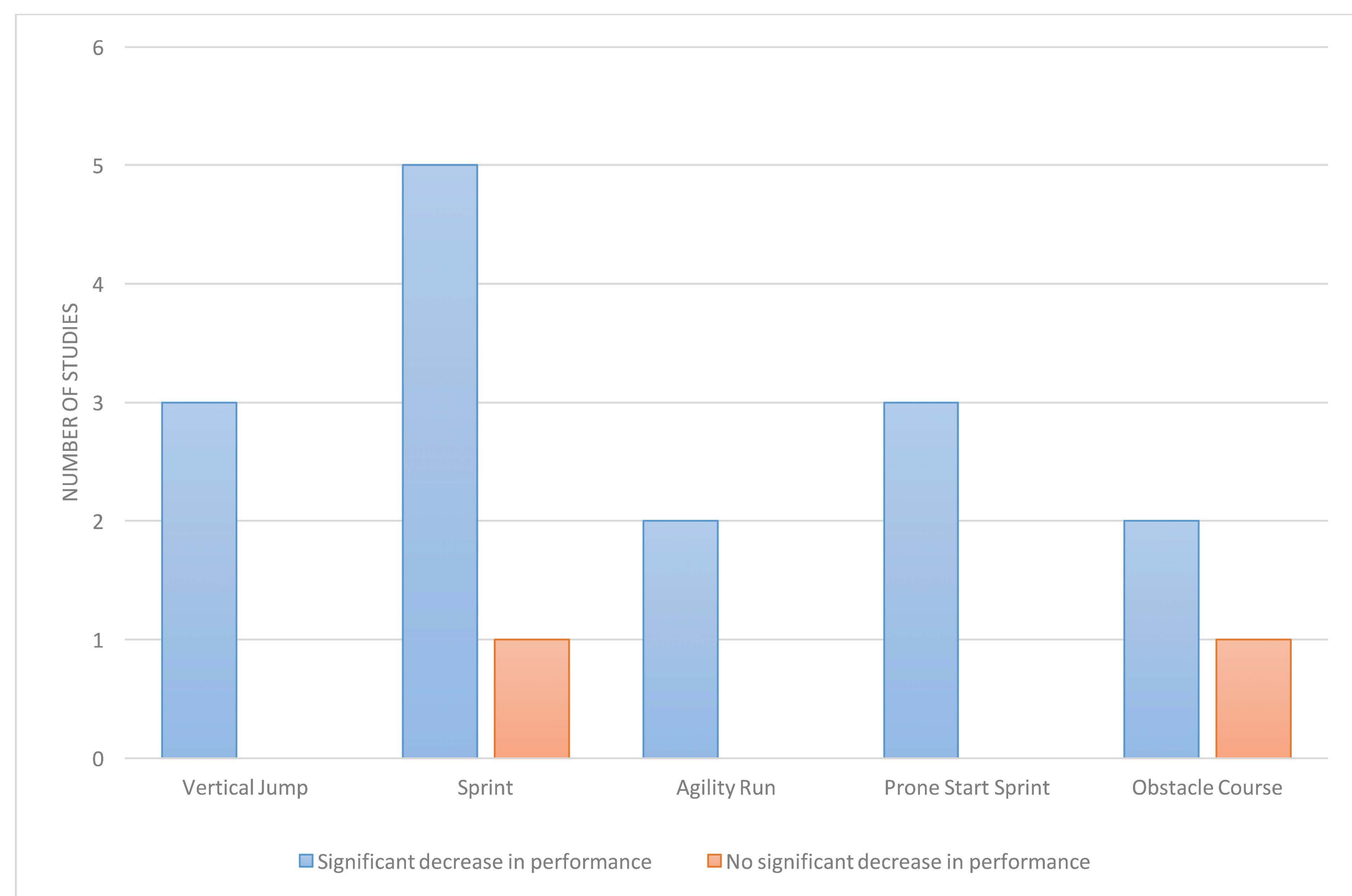


Figure 2. Impact of adding load on specific outcome measures



## RESULTS

- The mean CAS percentage for the methodological quality of the included studies was 58.16% (42.85-71.43%).
- The Cohen's kappa analysis revealed an interrater agreement of  $k = 0.728$ , indicating a 'substantial agreement'.
- Of the fourteen included studies, two studies measured the impact of added load on power, five studies measured the impact on agility, and seven studies measured both power and agility.
- Figure 2 represents the number of studies where power and agility were either affected or unaffected by added load. In general, power was shown to decrease when load was added to the tactical personnel, most significantly when completing a sprint.
- Agility performance generally decreased when load was added, especially in fire and movement simulations and obstacle courses incorporating agility movements.

## SUMMARY AND CONCLUSIONS

Current literature indicates that performance of both power and agility decrease when load is added to tactical personnel. This is significant given the fact that survivability in the line of duty is majorly influenced by the mobility of the officer [5]. The major increases in the modern day tactical officer's load may prove to be detrimental to the officer's safety in the field.

## IMPLICATIONS

Due to this, it is critical that training procedures for tactical personnel include training for power and agility specifically. Other measures to reduce the load the officer is required to carry should also be implemented, such as lighter body armour.